

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
ABOVE GROUND, MULTI-OUTLET PIPELINE
(Ft.)
CODE 431**

DEFINITION

A water distribution tubing consisting of aluminum, PVC, or lay-flat polyethylene pipeline with closely spaced orifices or gates.

PURPOSE

- To increase water use efficiency on irrigated land,
- To reduce irrigation induced soil erosion,
- To reduce runoff, flooding, or ponding from with inefficient irrigation water use,
- To improve the productivity, health, and vigor of the crop, and
- To increase the quantity and quality of feed and forage.

CONDITIONS WHERE PRACTICE APPLIES

The practice applies to irrigable land suited to surface application methods. This practice shall not be used in lieu of buried pipelines for conveyance systems. Reaches of un-gated pipe may be used as follows:

- To obtain enough working pressure for the system,
- To convey water between fields or to various points within a field (typically less than 300 feet),
- For splitting irrigation runs as in surge irrigation, or
- Where rock prevents buried pipeline installation.

The water supply and rate of irrigation delivery for the area served by the multi-outlet pipeline shall be sufficient to make irrigation practical for the crop to be grown and for the method of application.

CRITERIA

Pipe Sizes. The Aluminum and PVC pipe (rigid) shall be a minimum of 6 inches in diameter and not greater than 12 inches in diameter.

Working pressure. The maximum working pressure for rigid pipe shall be 10 pounds psi (23 feet of head). Working pressure shall be reduced to acceptable levels by installing an appropriate head control device.

The manufacturer's recommendations for maximum allowable working pressure shall be followed for lay-flat polyethylene pipe. The hoop stress formula in National Engineering Handbook (NEH) Part 636 Chapter 52 shall be used to determine maximum pressure, using a safety factor of 1.5, if recommendations are not available from the manufacturer.

Friction losses. For design purposes, friction head losses shall be no less than those computed by the Hazen-Williams equation, using roughness coefficients of C=130 for aluminum pipe, C=140 for lay-flat polyethylene pipe, and C=150 for PVC. PHAUCET, other appropriate computer software, or a multiple outlet factor shall be used in computing losses when appropriate. Refer to National Engineering Handbook (NEH), Part 650, EFH Chapter 15: Irrigation for guidance.

Velocity. Water velocity in the pipeline when operating at system capacity shall not exceed 7 feet per second unless appropriate surge protection is accounted for.

Capacity. The design capacity of the pipeline shall be sufficient to deliver an adequate irrigation stream for the planned irrigation method.

Outlet gates. Individual outlet gates shall have the capacity at design working head to deliver the required flow to a point at least 0.3 feet above the field surface.

Head requirement. The working head shall not be less than 0.5 feet above outlet gates, unless a detailed design or manufacturer's literature indicates that a lower head is adequate to deliver the required water to the field.

Where the design working head exceeds 5 feet or where stream flows are erosive, an effective method of energy dissipation shall be installed on each gate, or permanent vegetation shall be established along the pipeline to provide acceptable erosion control.

Flushing. A suitable outlet shall be installed at the end of the pipeline for drainage and flushing purposes.

Standard - 431- 2

Materials. Rigid pipe shall be aluminum or PVC material certified for above ground use. All fittings and couplers shall equal or exceed the pressure rating of the pipe with which they will be used. They shall be made of material that is recommended by the manufacturer for use with the pipe

Rigid pipe and appurtenances shall be furnished with a coupling system that is interchangeable with the selected pipe material.

Rubber gaskets shall be according to the manufacturer's standard design dimensions and tolerances for the pipe material selected. They shall be of such size and shape as to provide an adequate compressive force against the spigot and socket after assembly to effect a positive seal. The gasket shall be the sole element depended upon to make the joint flexible and watertight. The gasket shall be a continuous elastomeric ring.

Minimum wall thickness for aluminum gated pipe shall be 0.050 inches for 6 through 10 inches in diameter and 0.058 inches for 12 inch diameter pipe.

Corrosion protection shall be provided for aluminum pipe when the pipe will be in contact:

- With water copper content above 0.02 ppm or
- With soil having a resistivity of less than 500 ohm-cm, or a pH of less than 4 or greater than 9

The minimum wall thickness of rigid PVC pipe shall be 0.120 inches. The pipe pressure rating shall be a minimum of 22 psi (50 ft).

The minimum wall thickness of lay-flat polyethylene pipe shall be 6 mil (0.006 inch).

Related structures. An open ditch supply shall include a permanent water control structure for the inlet to the multi-outlet pipe.

When the water supply for lay-flat polyethylene pipe is greater than 0.5 feet above ground, a rigid pipe shall be used to convey water between the outlet and the coupling of lay-flat polyethylene pipe.

CONSIDERATIONS

Consider the following:

- Using thrust control where the pipe is subject to movement.
- Applicability of future surge or automation alternatives in preparing the design.
- Using thrust control where the pipe is subject to movement.

- The water source and potential trash types and amounts when evaluating screen types and sizes and in the design of an inlet screen.
- Effects on the water budget, including water quality, volume of runoff, and rates of runoff, in any downstream drainage.
- Effects on wetlands and water related wildlife.
- Effects on water flows and aquifers and the effects on other water uses and users.
- Disposal of unserviceable lay-flat polyethylene pipe and the potential of recycling.
- Anchoring lay-flat polyethylene tubing when winds may cause it to move.
- Including a water measuring device to assist in irrigation water management.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared to show site specific details. The drawings and specifications shall show pipe location(s), pipe size(s), construction details for the inlet structure and screen as applicable, sizes and construction details for head control works, and gate spacing and erosion details as appropriate.

If lay-flat polyethylene pipe is included in the plan, and the manufacturer's recommendations for working pressure are not available, an appropriate formula or table for determining maximum working pressure shall be included in the practice specification.

Plans should also included gate openings or orifice sizes necessary to deliver the design flows as determined by appropriate surface irrigation design procedures.

OPERATION AND MAINTENANCE

The operation and maintenance plan for the system shall include requirements for:

- Flushing pipe,
- Cleaning and repairing of screens and structures,
- Replacing individual gates and gaskets,
- Off-season storage and handling of pipe, and
- Anchoring pipe where wind conditions require.

The plan should include the recommendation to recycle lay-flat polyethylene pipe.

If the source of water supply is from a water well, the operation and maintenance plan shall note that the presence of sand in the pipeline may indicate problems with the water well.